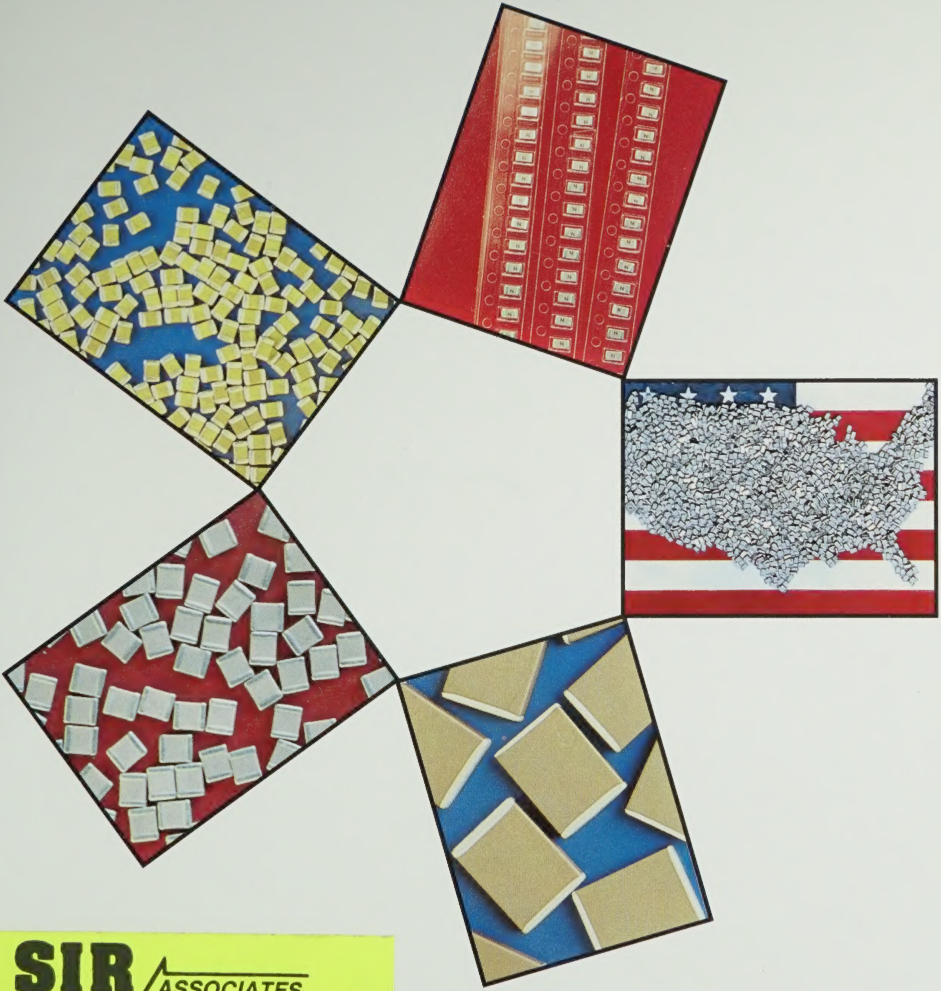
NOVACAP

A DOVER TECHNOLOGIES COMPANY

CERAMIC CHIP CAPACITORS PRODUCT CATALOG



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NOVACAP

A DOVER TECHNOLOGIES COMPANY

CERAMIC CHIP CAPACITORS

NOVACAP QUALITY POLICY

QUALITY AT NOVACAP IS CONFORMANCE TO REQUIREMENTS IN ALL OUR ACTIVITIES WITH:

- OUR CUSTOMERS
- OUR VENDORS
- OUR EMPLOYEES

THE SYSTEM FOR QUALITY IS PREVENTION OF DEFECTS, AND TO ATTAIN CONTINUOUS, MEASURABLE IMPROVEMENT IN EVERYTHING WE DO.

EVERY NOVACAP EMPLOYEE IS COMMITTED TO DOING THE JOB RIGHT, THE FIRST TIME.

NOVACAP

A DOVER TECHNOLOGIES COMPANY

CERAMIC CHIP CAPACITORS

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NOVACAP PART NUMBER CODE

(HOW TO ORDER)

0805 N 102 J 500 N T M H

SIZE CODE

See catalog for chip sizes.
Code is L x W in inches.

DIELECTRIC

N = COG (NPO)
B = X7R
X = BX
Z = Z5U

CAPACITANCE

Value in picofarads: Two significant figures followed by number of zeros. 102 = 1000 pf.

CAPACITANCE TOLERANCE

B = ± 0.10 pF
C = ± 0.25 pF
D = ± 0.50 pF
F = ± 1.0%
G = ± 2.0%
H = ± 3.0%
J = ± 5.0%
K = ± 10%
M = ± 20%
Z = + 80% - 20%
P = + 100% - 0%

Tolerances may be restricted by dielectric type; see catalog.

VOLTAGE

VDCW: Two significant figures followed by number of zeros.

250 = 25 VDC
500 = 50
101 = 100
201 = 200
102 = 1000
103 = 10,000

See catalog for available voltage ratings on specific capacitors.

TERMINATION

N = Nickel barrier, 90% tin, 10% lead overcoat
P = Silver palladium
S = Silver

PACKING CODE

B = Bulk T = Reeled W = Waffle pack.

MARKING OPTION

M = Marked.

NON STANDARD TEST CODE OPTION

No code is standard testing. H = High reliability testing.

CHIP CAPACITOR SELECTION

Dielectric Type:

The choice of dielectric characteristic is largely determined by the temperature stability desired and variation of properties with test conditions:

COG: Ultra stable Class I dielectric, with negligible dependance of electrical properties on temperature, frequency or time. Used in circuitry requiring stable performance.

X7R: Stable Class II dielectric, with predictable change in properties with temperature, voltage, frequency and time. Used as blocking, coupling, by-passing and frequency discriminating elements. This dielectric is ferroelectric and offers higher capacitance than Class I.

Z5U: General purpose Class II dielectric with higher dielectric constant and greater variation of properties with temperature and test conditions. Very high capacitance per unit volume is attainable for general purpose applications.

Capacitor Size:

Size is determined by circuit constraints. Smaller units are generally less expensive; 0805 is the most economical size.

Capacitor Termination:

Nickel barrier termination, with exceptional solder leach resistance is recommended for all applications involving solder. Silver palladium termination is recommended for epoxy and wire bonding attachment methods; also for solder reflow below the nickel barrier tin-lead coating reflow temperature (< 230°C). The more ductile silver termination is preferred for units to be leaded, to minimize thermal cycle stresses.

Packaging:

Units available in bulk, reeled or in waffle pack.

Non Standard Requirements:

NOVACAP will provide product manufactured and tested to specific customer requirements; consult with the factory.

Samples:

NOVACAP will provide sample units for prototype purposes and evaluation.

Technical Information & Assistance:

See the **NOVACAP TECHNICAL BROCHURE** for detailed information on capacitors, dielectrics and performance, available upon request. For more information, contact the factory directly: call 805-295-5920, or 800-CAP-CHIP. Fax number 805-295-5928.

Soldering Methods:

Attachment methods commonly used in the industry and recommended are Reflow Soldering, Wave Soldering, and Vapor Phase Soldering.

Precautions:

All solder chip attachment methods involve thermal cycling of the components; the rate of heating and cooling must be controlled so as to preclude thermal shock cracking of the devices. In general, a heating and cooling rate which does not exceed 100°C per minute for any of the soldering processes is advisable. Avoid contact with heat sinks, such as conveyor belts, or cleaning solutions, before the chips reach ambient temperature.

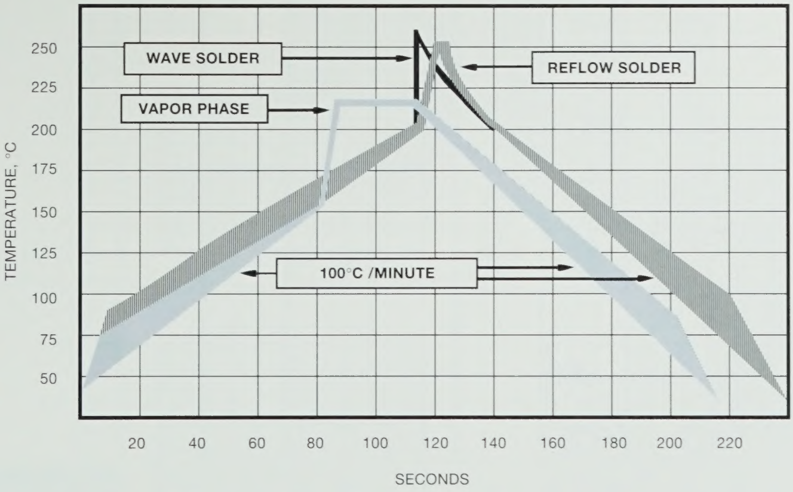
Cleaning:

Chip capacitors can withstand the commonly used cleaning agents, such as water, alcohol and degreaser solvents. Ascertain that no flux residues are left on the chip surfaces.

Shelf Life:

Capacitors will be solderable for a minimum of one year from date of shipment, if stored in the original packaging, i.e., reels, bags, or waffle packages.

SOLDER ATTACHMENT RECOMMENDED PROFILES



COG (NPO) DIELECTRIC

Ultra stable Class I dielectric (EIA COG) or NPO: linear temperature coefficient, low loss, stable electrical properties with time, voltage and frequency. COG dielectric code is N.

DIELECTRIC CHARACTERISTICS

Operating Temperature Range:
-55°C to 125°C.

Temperature Coefficient:
0 ± 30 ppm/°C.

Temperature-Voltage Coefficient:
ΔC max @ VDCW: 0 ± 30 ppm/°C.

Dissipation Factor:
0.1% max, 0.02% typical

Insulation Resistance:
@ 25°C, VDCW > 100GΩ, or > 1000 ΩF whichever is less.
@ 125°C, VDCW > 10GΩ, or > 100 ΩF whichever is less.

Dielectric Withstanding Voltage:
2.5 x VDCW

Aging Rate:
0% per decade hour.

Test Parameters:
1 KHz, 1.0 VRMS, ± 0.2 VRMS, 25°C.
1 MHz, 1.0 VRMS, for units < 100 pF.

Non Standard Testing:
NOVACAP will test to customer SCD, consult factory; H = High Reliability Testing.

See the **NOVACAP** Technical Brochure for detailed information on dielectrics.

PRODUCT OFFERING

Sizes:
See chart for standard EIA sizes and thickness. Other sizes are available, from 0402 size to 5830, see catalog page 12.

Capacitance Range:
0.5 pF to .047 μF for standard sizes.

Capacitance Tolerance:

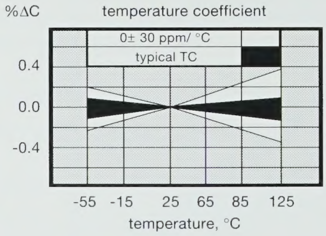
B = ± 0.10 pF (0.5 to 10 pF)
C = ± 0.25 pF (0.5 to 10 pF)
D = ± 0.50 pF (0.5 to 20 pF)
F = ± 1.0% (> 10 pF)
G = ± 2.0% (> 10 pF)
H = ± 3.0 pF
J = ± 5.0%
K = ± 10%
M = ± 20%

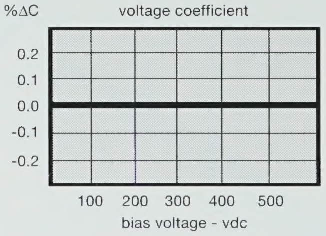
Voltage Ratings:
25 to 500 volts DC standard.

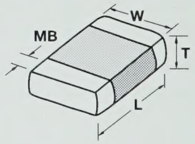
Terminations:
N = Nickel Barrier, with 90% Sn, 10% Pb
P = Silver Palladium
S = Silver

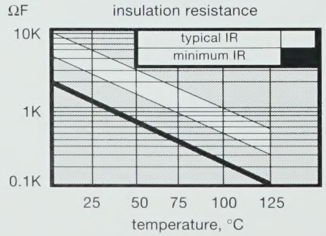
Packaging:
B = Bulk (standard). T = Reeled on 7" or 13" reels.

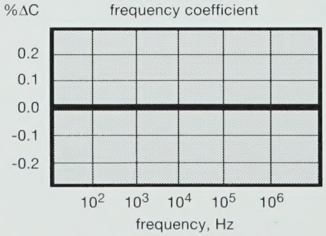
Marking:
M = EIA code or Vendor ID laser marking (optional).



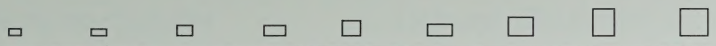




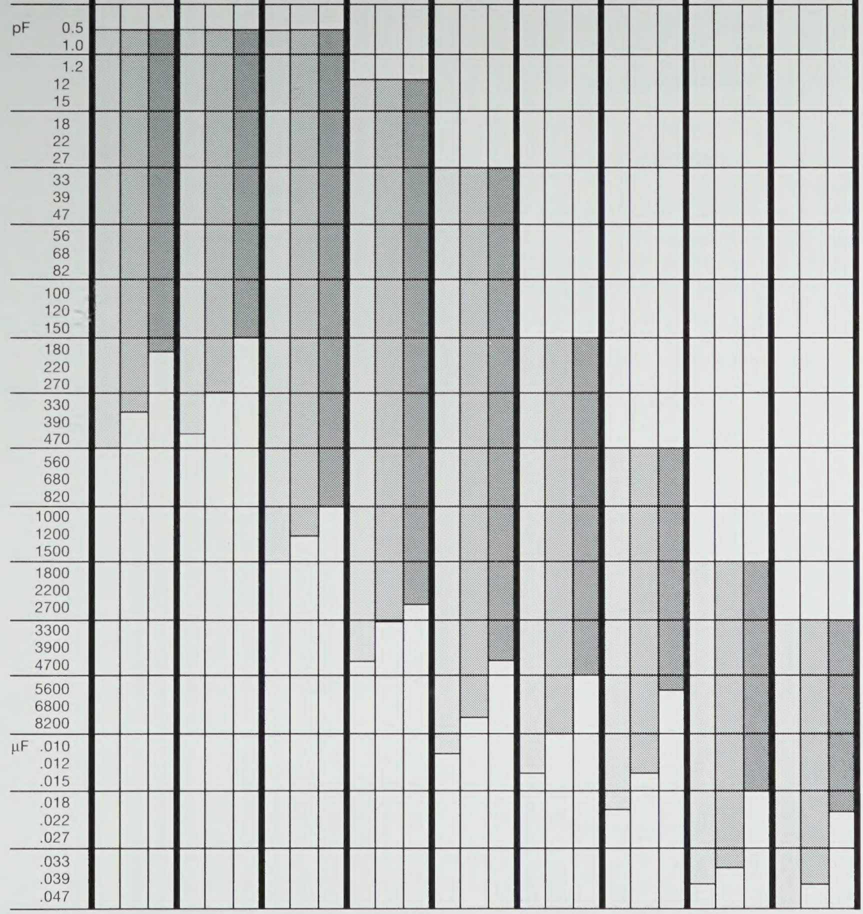




HOW TO ORDER: SEE PAGE 3



SIZE	0504	0603	0805	1206	1210	1808	1812	1825	2225
Length L	.050 (1.27)	.060 (1.52)	.080 (2.03)	.125 (3.18)	.125 (3.18)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.220 (5.59)
Width W	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.100 (2.54)	.080 (2.03)	.125 (3.18)	.250 (6.35)	.250 (6.35)
T max	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.065 (1.65)	.065 (1.65)	.065 (1.65)	.080 (2.03)	.080 (2.03)
MB	.005 (.127)	.010 (.254)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)
Voltage	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500



NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010" (0.25mm), except for: 0504, 0603 Length and Width ± .005" (0.12mm), MB on 0504, ± .003" (.075mm), and MB on 0603 ± .005" (0.12mm). FOR OTHER SIZES, VALUES AND VOLTAGE RATINGS, see pages 12, 16.

X7R DIELECTRIC

Stable EIA Class II dielectric, with ± 15% ΔC temperature coefficient and predictable variation of electrical properties with time, frequency and voltage. X7R dielectric code is B.

DIELECTRIC CHARACTERISTICS

Operating Temperature Range:
-55°C to 125°C.

Temperature Coefficient:
± 15% ΔC max.

Dissipation Factor:
2.5% max, 1.8% typical.

Insulation Resistance:
@ 25°C, VDCW > 100GΩ, or > 1000 ΩF whichever is less.
@ 125°C, VDCW > 10GΩ, or > 100 ΩF whichever is less.

Dielectric Withstanding Voltage:
2.5 x VDCW.

Aging Rate:
< 2.0% per decade hour.

Test Parameters:
1 KHz, 1.0 VRMS, ± 0.2 VRMS, 25°C.

Non Standard Testing:
NOVACAP will test to customer SCD, consult factory; H = High Reliability Testing.

See the **NOVACAP** Technical Brochure for detailed information on dielectrics.

PRODUCT OFFERING

Sizes:
See chart for standard EIA sizes and thickness. Other sizes are available, from 0402 size to 5830, see catalog page 12.

Capacitance Range:
100 pF to 1.20 μF for standard sizes.

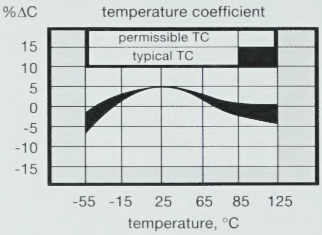
Capacitance Tolerance:
J = ± 5%
K = ± 10%
M = ± 20%
Z = + 80% - 20%
P = + 100% - 0%

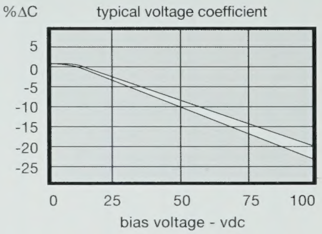
Voltage Ratings:
25 to 200 volts DC standard.

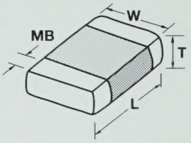
Terminations:
N = Nickel Barrier, with 90% Sn, 10% Pb
P = Silver Palladium
S = Silver

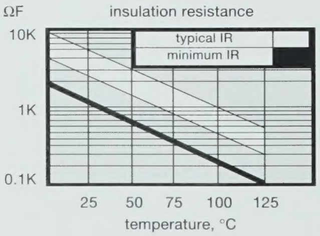
Packaging:
B = Bulk (standard). T = Reeled on 7" or 13" reels.

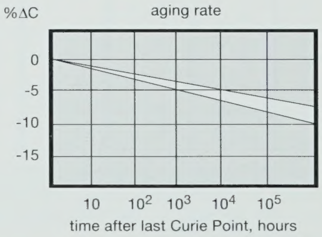
Marking:
M = EIA code or Vendor ID laser marking (optional).





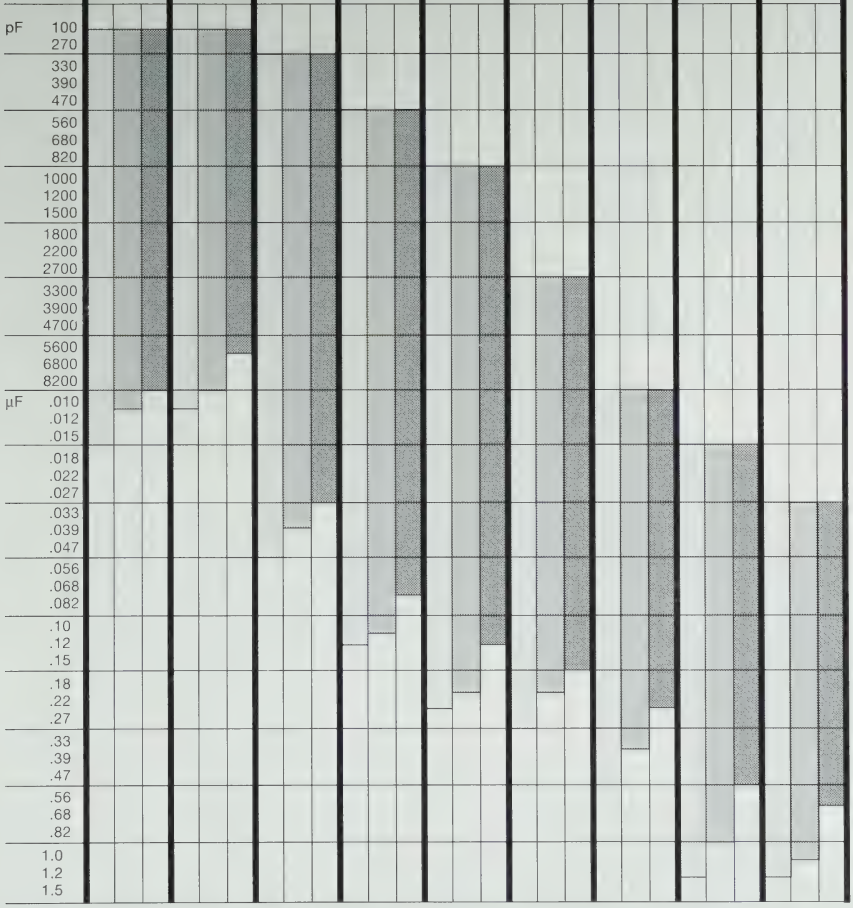






HOW TO ORDER: SEE PAGE 3

SIZE	0504	0603	0805	1206	1210	1808	1812	1825	2225
Length L	.050 (1.27)	.060 (1.52)	.080 (2.03)	.125 (3.18)	.125 (3.18)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.220 (5.59)
Width W	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.100 (2.54)	.080 (2.03)	.125 (3.18)	.250 (6.35)	.250 (6.35)
T max	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.065 (1.65)	.065 (1.65)	.065 (1.65)	.080 (2.03)	.080 (2.03)
MB	.005 (.127)	.010 (.254)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)
Voltage	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200



NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010" (0.25mm), except for: 0504, 0603 Length and Width ± .005" (0.12mm), MB on 0504, ± .003" (.075mm), and MB on 0603 ± .005" (0.12mm). FOR OTHER SIZES, VALUES AND VOLTAGE RATINGS, see pages 12, 16.

Z5U DIELECTRIC

General purpose EIA Class II dielectric with +22% to -56% ΔC temperature coefficient and highest capacitance per unit volume. Z5U dielectric code is Z.

DIELECTRIC CHARACTERISTICS

Operating Temperature Range:
+10°C to 85°C.

Temperature Coefficient:
+22% - 56% ΔC max .

Dissipation Factor:
3.0% max, 2.0% typical.

Insulation Resistance:
@ 25°C, VDCW > 100GΩ, or > 1000 ΩF whichever is less.

Dielectric Withstanding Voltage:
2.5 x VDCW.

Aging Rate:
< 2.0% per decade hour.

Test Parameters:
1 KHz, 0.5 VRMS, ± 0.1 VRMS, 25°C.

See the **NOVACAP** Technical Brochure for detailed information on dielectrics.

PRODUCT OFFERING

Sizes:
See chart for standard EIA sizes and thickness. Other sizes are available, from 0402 size to 5830, see catalog page 12.

Capacitance Range:
560 pF to 3.90 μF for standard sizes.

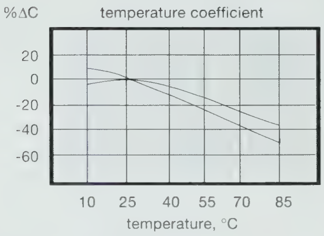
Capacitance Tolerance:
M = ± 20%
Z = +80% - 20%
P = +100% - 0%

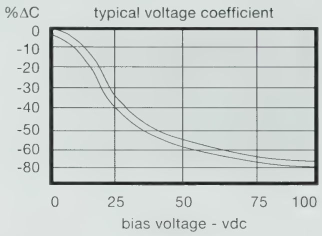
Voltage Ratings:
25 to 100 volts DC standard.

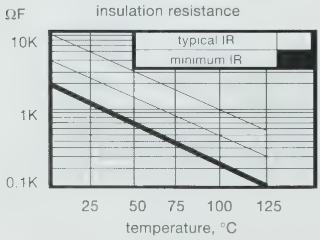
Terminations:
N = Nickel Barrier, with 90% Sn, 10% Pb
P = Silver Palladium

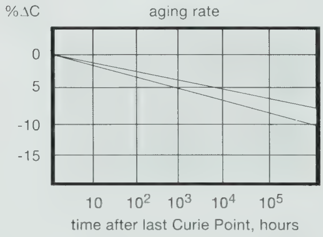
Packaging:
B = Bulk (standard).
T = Reeled on 7" or 13" reels.

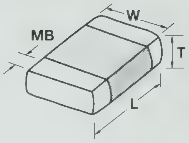
Marking:
M = EIA code or Vendor ID laser marking (optional).





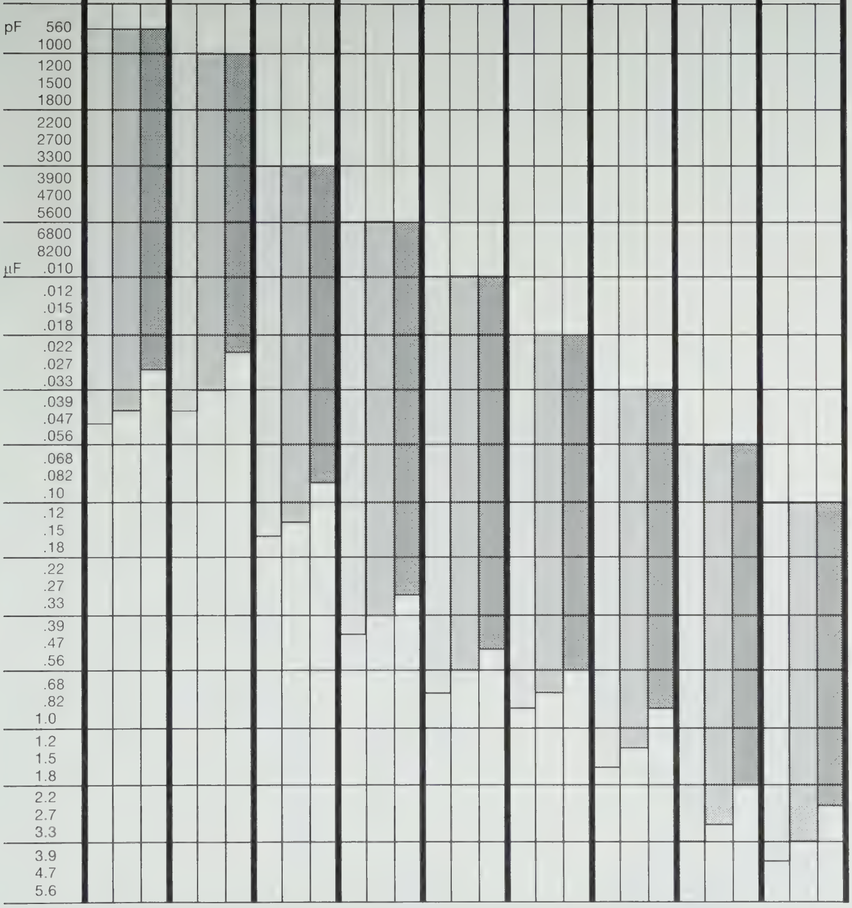






HOW TO ORDER: SEE PAGE 3

SIZE	0504	0603	0805	1206	1210	1808	1812	1825	2225
Length L	.050 (1.27)	.060 (1.52)	.080 (2.03)	.125 (3.18)	.125 (3.18)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.220 (5.59)
Width W	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.100 (2.54)	.080 (2.03)	.125 (3.18)	.250 (6.35)	.250 (6.35)
T max	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.065 (1.65)	.065 (1.65)	.065 (1.65)	.080 (2.03)	.080 (2.03)
MB	.005 (.127)	.010 (.254)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)
Voltage	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100



NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010" (0.25mm), except for: 0504, 0603 Length and Width ± .005" (0.12mm), MB on 0504, ± .003" (.075mm), and MB on 0603 ± .005" (0.12mm). FOR OTHER SIZES AND VALUES, see pages12, 16.

SPECIAL SIZES

NOVACAP manufactures non standard sizes to satisfy circuit layout constraints, and to provide unique capacitance ranges in very small or large configurations. Units are available in COG, X7R and Z5U dielectrics; consult pages 6 through 10 for details on dielectric properties.

PRODUCT OFFERING

See charts for COG, X7R and Z5U sizes, ranges and voltage ratings.

Capacitance tolerances available depend on dielectric type:

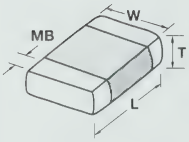
COG: D tolerance through M
X7R: J tolerance through P
Z5U: M tolerance through P

D = ± 0.50pF (0.5 to 20 pF only)
F = ± 1.0 % (> 10 pF only)
G = ± 2.0 %
H = ± 3.0 %
J = ± 5.0 %

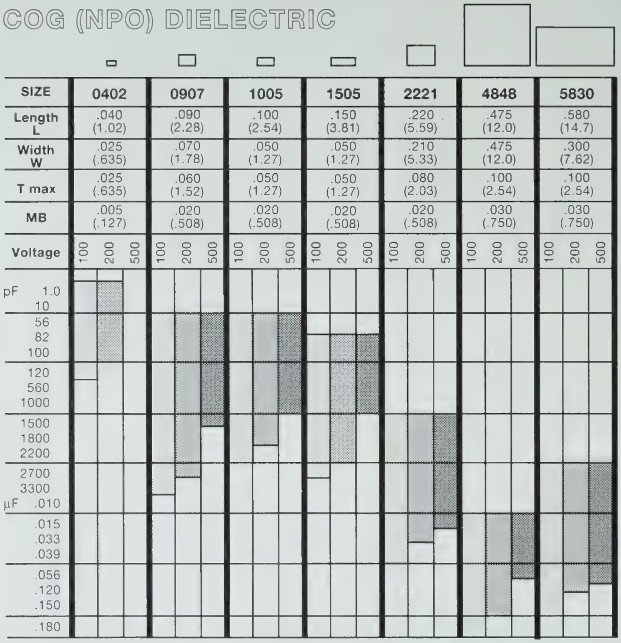
K = ± 10%
M = ± 20%
Z = + 80% - 20%
P = + 100% - 0%

Terminations:
N = Nickel Barrier, with 90% Sn, 10% Pb
P = Silver Palladium
S = Silver

Packaging:
B = Bulk (standard).
T = Reeled on 7" or 13" reels, 1005, 1505, 2221 sizes only .



COG (NPO) DIELECTRIC



SIZE	0402	0907	1005	1505	2221	4848	5830
Length L	.040 (1.02)	.090 (2.28)	.100 (2.54)	.150 (3.81)	.220 (5.59)	.475 (12.0)	.580 (14.7)
Width W	.025 (.635)	.070 (1.78)	.050 (1.27)	.050 (1.27)	.210 (5.33)	.475 (12.0)	.300 (7.62)
T max	.025 (.635)	.060 (1.52)	.050 (1.27)	.050 (1.27)	.080 (2.03)	.100 (2.54)	.100 (2.54)
MB	.005 (.127)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.030 (.750)	.030 (.750)
Voltage	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500	100 200 500

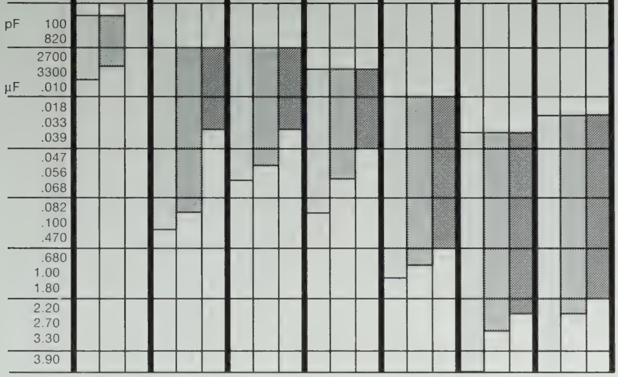
pF 1.0
10
56
82
100
120
560
1000
1500
1800
2200
2700
3300
µF .010
.015
.033
.039
.056
.120
.150
.180

NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010" (0.25mm), except for: 0402, Length, Width and MB ± .003" (0.07mm). For other sizes, values and voltage ratings, see pages 6, 7.

HOW TO ORDER: SEE PAGE 3

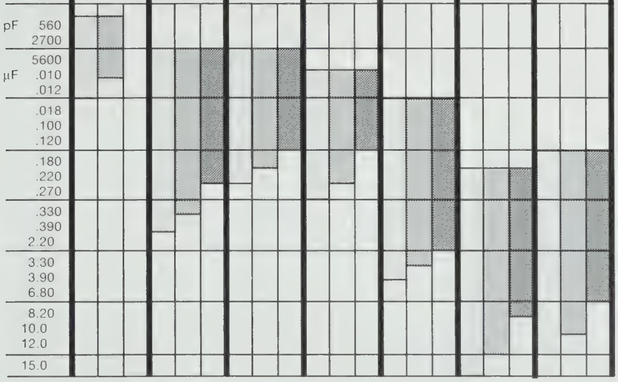
X7R DIELECTRIC

SIZE	0402	0907	1005	1505	2221	4848	5830
Length L	.040 (1.02)	.090 (2.28)	.100 (2.54)	.150 (3.81)	.220 (5.59)	.475 (12.0)	.580 (14.7)
Width W	.025 (.635)	.070 (1.78)	.050 (1.27)	.050 (1.27)	.210 (5.33)	.475 (12.0)	.300 (7.62)
T max	.025 (.635)	.060 (1.52)	.050 (1.27)	.050 (1.27)	.080 (2.03)	.100 (2.54)	.100 (2.54)
MB	.005 (.127)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.030 (.750)	.030 (.750)
Voltage	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200	50 100 200



Z5U DIELECTRIC

SIZE	0402	0907	1005	1505	2221	4848	5830
Length L	.040 (1.02)	.090 (2.28)	.100 (2.54)	.150 (3.81)	.220 (5.59)	.475 (12.0)	.580 (14.7)
Width W	.025 (.635)	.070 (1.78)	.050 (1.27)	.050 (1.27)	.210 (5.33)	.475 (12.0)	.300 (7.62)
T max	.025 (.635)	.060 (1.52)	.050 (1.27)	.050 (1.27)	.080 (2.03)	.100 (2.54)	.100 (2.54)
MB	.005 (.127)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.030 (.750)	.030 (.750)
Voltage	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100



NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010" (0.25mm), except for: 0402, Length, Width and MB ± .003" (0.07mm). For other sizes, values and voltage ratings, see pages 8 through 11.

BX DIELECTRIC

BX dielectric characteristics are identical to X7R dielectric, except for the added restriction that the Temperature-Voltage Coefficient (TVC) is not to exceed -25% ΔC at working volts, over the operating temperature range (-55°C to 125°C). NOVACAP manufactures chips using dielectrics with minimal voltage coefficient and layer thickness design to meet BX requirements. See page 8 for all other dielectric properties. BX dielectric code is X.

PRODUCT OFFERING

Sizes:
See charts. Capacitance range 100 pF to 1.2 μF.

Capacitance Tolerance:

J = ± 5.0%
K = ± 10%
M = ± 20%
Z = + 80% - 20%
P = + 100% - 0%

Voltage Ratings:
25, 50 and 100 volts DC standard.

Terminations:

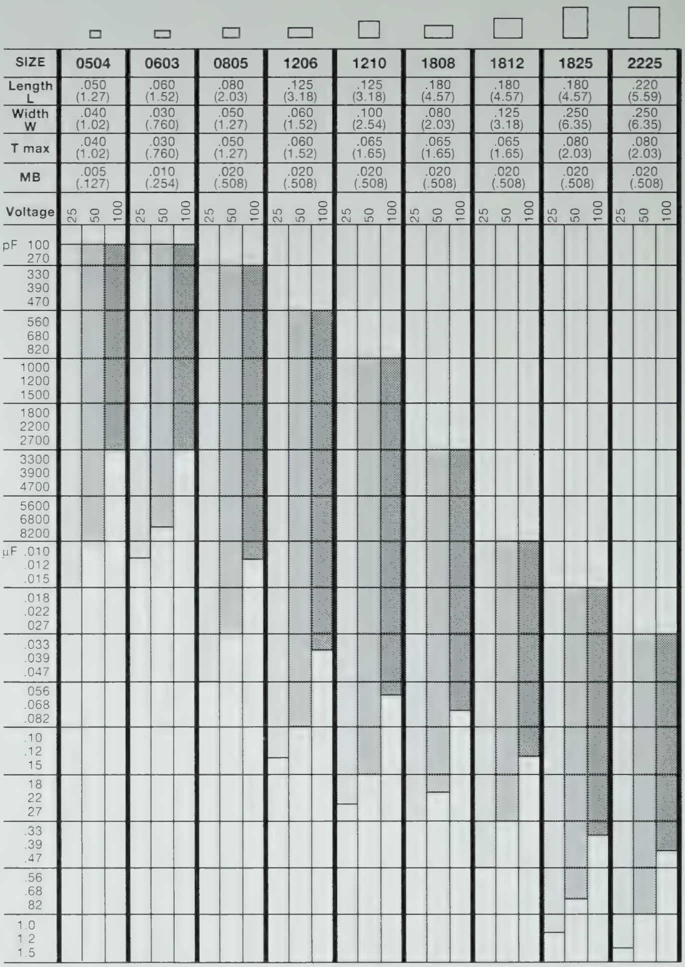
N = Nickel Barrier, with 90% Sn, 10% Pb
P = Silver Palladium

Packaging:

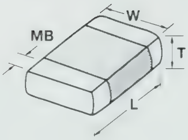
B = Bulk (standard).
T = Reeled on 7" or 13" reels.

Marking:

M = EIA code or Vendor ID laser marking (optional).



SIZE	0504	0603	0805	1206	1210	1808	1812	1825	2225
Length L	.050 (1.27)	.060 (1.52)	.080 (2.03)	.125 (3.18)	.125 (3.18)	.180 (4.57)	.180 (4.57)	.180 (4.57)	.220 (5.59)
Width W	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.100 (2.54)	.080 (2.03)	.125 (3.18)	.250 (6.35)	.250 (6.35)
T max	.040 (1.02)	.030 (.760)	.050 (1.27)	.060 (1.52)	.065 (1.65)	.065 (1.65)	.065 (1.65)	.080 (2.03)	.080 (2.03)
MB	.005 (.127)	.010 (.254)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)	.020 (.508)
Voltage	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100	25 50 100



NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010" (0.25mm), except for: 0504, 0603 Length and Width ± .005" (0.12mm), MB on 0504, ± .003" (.075mm), and MB on 0603 ± .005" (0.12mm).

HOW TO ORDER: SEE PAGE 3

THIN PROFILE (Z5U) CAPACITORS

EIA sizes 1206 and 1210 chips are offered in thin profile configuration for use as decoupling capacitors under other circuit elements. Other sizes and dielectrics (COG, X7R) are also available with maximum thickness designs for specialty low profile packages; consult with NOVACAP.

DIELECTRIC CHARACTERISTICS

Operating Temperature Range:
+10°C to 85°C.

Temperature Coefficient:
+22% - 56% ΔC max.

Dissipation Factor:
3.0% max, 2.0% typical.

Insulation Resistance:
@ 25°C, VDCW > 100GΩ, or > 1000 ΩF whichever is less.

Dielectric Withstanding Voltage:
2.5 x VDCW.

Aging Rate:
< 2.0% per decade hour.

Test Parameters:
1 KHz, 0.5 VRMS, ± 0.1 VRMS, 25°C.

PRODUCT OFFERING

Sizes:
1206 and 1210. See charts for maximum values at discrete thicknesses and voltages.

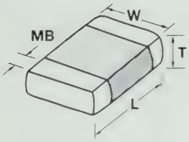
Capacitance Range:
.068 pF to .470 μF.

Capacitance Tolerance:
M = ± 20%
Z = + 80% - 20%
P = + 100% - 0%

Voltage Ratings:
25 to 50 VDC.

Terminations:
N = Nickel Barrier, with 90% Sn, 10% Pb
P = Silver Palladium

Packaging:
B = Bulk (standard).
T = Reeled on 7" or 13" reels.



HOW TO ORDER: SEE PAGE 3

Z5U DIELECTRIC

SIZE	1206								1210							
Length L	.125 (3.18)								.125 (3.18)							
Width W	.060 (1.52)								.100 (2.54)							
Thickness Max	.020 (.508)		.022 (.558)		.026 (.660)		.030 (.760)		.020 (.508)		.022 (.558)		.026 (.660)		.030 (.760)	
Voltage	25	50	25	50	25	50	25	50	25	50	25	50	25	50	25	50
Capacitance μF																
.068	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨
.082	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨
100	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨
.120	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨
.150	░		░	▨	░	▨	░	▨	░	▨	░	▨	░	▨	░	▨
.180			░		░	▨	░	▨	░	▨	░	▨	░	▨	░	▨
.220					░		░	▨	░	▨	░	▨	░	▨	░	▨
.270							░		░		░	▨	░	▨	░	▨
.330											░		░	▨	░	▨
.390													░		░	▨
.470															░	
.560																

NOTES: Dimensions in inches; bracketed dimensions are in millimeters. Tolerances are ± .010 (0.25mm). MB dimension is .020" (.508mm).

HIGH VOLTAGE CHIP CAPACITORS

NOVACAP high voltage products are designed, manufactured and tested 100% for optimum performance. These capacitors offer the highest capacitance available per kilovolt rating, in COG and X7R characteristics. The non-polar design permits capacitors to be arrayed in stacks with no voltage gradient between units. Units have rounded surfaces to improve structural integrity and encapsulation in use. Applications include power supplies and multiplier circuits for aerospace, airborne and military applications. Specially designed product is available, to 20 K.V. ratings; for your specific requirements, contact NOVACAP.

PRODUCT OFFERING

Capacitance tolerances available are J through P, COG and X7R:

J = ± 5%
K = ± 10%
M = ± 20%
Z = +80% - 20%
P = +100% - 0%

Terminations:

S = Silver
P = Silver Palladium
N = Nickel barrier, available on 1808,1812, 1825, 2225. Consult factory on other sizes.

Packaging:

B = Bulk.
T = Reeled on 7" or 13" reels, sizes 1808, 1812, 1825, 2225 only.
W = Waffle pack.

Charts:

Charts give maximum capacitance in COG and X7R, for given sizes and voltages to 10 K.V.

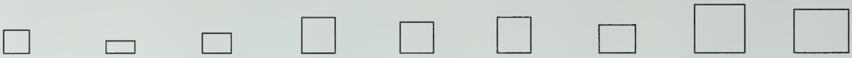
Dielectric Characteristics:
COG and X7R, see pages 6 and 8 for dielectric specifications.

Operating Temperature Range:
-55°C to 125°C.

Operating Voltage:
600 VDC to 10,000 VDC, standard. Available to 20 K.V., consult NOVACAP.

Dielectric Withstanding Voltage:
1.2 x VDCW minimum, 50 milliamps max, 5 seconds.

Test Parameters:
1 KHz, 1.0 VRMS, ± 0.2 VRMS, 25°C, 0 Volts bias.



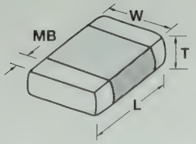
	SIZE	1515		1808		1812		1825		2020		2225		2520		3333		3530	
	Length L	.150 (3.81)		.180 (4.57)		.180 (4.57)		.180 (4.57)		.200 (5.08)		.220 (5.59)		.230 (5.84)		.330 (8.38)		.350 (8.89)	
	Width W	.150 (3.81)		.080 (2.03)		.125 (3.18)		.250 (6.35)		.200 (5.08)		.250 (6.35)		.190 (4.82)		.330 (8.38)		.300 (7.62)	
	T max	.130 (3.30)		.065 (1.65)		.065 (1.65)		.080 (2.03)		.150 (3.81)		.080 (2.03)		.150 (3.81)		.180 (4.57)		.180 (4.57)	
	MB	.040 (1.02)		.020 (.508)		.020 (.508)		.020 (.508)		.040 (1.02)		.020 (.508)		.050 (1.27)		.050 (1.27)		.050 (1.27)	
		MAXIMUM CAPACITANCE (pF). 3 DIGIT CODE, SEE NOTE 2																	
	Dielectric	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R
WORKING VOLTAGE	600			392	273	472	473	123	104			153	124						
	800			272	183	392	273	103	683			123	823						
	1000	152	123	222	123	332	183	822	473	272	223	103	563	332	333	103	104	822	823
	2000	821	472	182		272		682		182	103	822		222	123	682	333	562	333
	3000	561	222	821		122		272		821	392	332		102	472	332	123	272	123
	4000	271	821	391		561		152		471	152	182		561	182	182	562	152	562
	5000									331	102			391	122	122	392	102	392
	6000													331	681	821	222	681	222
	7000															391	122	331	122

NOTE 1. Dimensions in inches; bracketed dimensions in millimeters. Tolerances depend on chip size: for 1808, 1812, 1825 and 2225 (std EIA sizes) tolerances are ± .010" (0.25mm) all dimensions. All other High Voltage units tolerances are ±5%, L and W, or ± .015" (0.38mm), whichever is greater; MB dimensions are maximum.

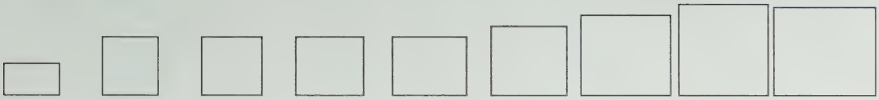
NOTE 2. Capacitance value in picofarads: two significant digits, followed by number of zeros. 102 = 1000 pF.

HIGH VOLTAGE CHIP CAPACITORS

NOVACAP IS THE LEADER IN HIGH VOLTAGE MLC TECHNOLOGY



HOW TO ORDER: SEE PAGE 3



SIZE		4020		4040		4540		5040		5440		5550		6560		6666		7565	
Length L		.400 (10.2)		.400 (10.2)		.450 (11.4)		.460 (11.7)		.540 (13.7)		.550 (11.4)		.650 (16.5)		.660 (16.8)		.750 (19.0)	
Width W		.200 (5.08)		.400 (10.2)		.400 (10.2)		.400 (10.2)		.400 (10.2)		.500 (12.7)		.600 (15.2)		.660 (16.8)		.650 (16.5)	
T max		.180 (4.57)		.180 (4.57)		.180 (4.57)		.180 (4.57)		.180 (4.57)		.180 (4 57)		.200 (5.08)		.250 (6.35)		.250 (6.35)	
MB		.060 (1.52)		.060 (1.52)		.060 (1.52)		.060 (1.52)		.060 (1.52)		.060 (1.52)		.060 (1.52)		.060 (1.52)		.060 (1.52)	
		MAXIMUM CAPACITANCE (pF). 3 DIGIT CODE, SEE NOTE 2																	
Dielectric		COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R	COG	X7R
WORKING VOLTAGE	1000	222	223	153	124	183	154	272	273	223	224	273	274	393	394	183	154	473	474
	2000	152	123	103	563	123	683	182	153	153	683	183	823	273	124	103	104	333	154
	3000	122	562	472	223	562	273	152	682	682	333	822	393	123	563	822	393	153	683
	4000	102	272	332	822	392	103	102	332	392	123	472	153	822	223	682	183	103	273
	5000	561	182	182	562	222	682	681	222	272	822	332	103	472	153	392	153	562	183
	6000	471	152	152	392	182	472	561	182	182	562	222	682	392	103	332	103	472	123
	7000	391	102	561	182	681	222	391	122	821	272	102	332	182	562	222	682	222	682
	8000	271	821	471	102	561	122	331	102	561	152	821	182	122	272	182	562	152	332
	9000	181	681					221	821							152	392		
	10000	151	561					181	681							102	272		

NOTE 1. Dimensions in inches; bracketed dimensions in millimeters. Tolerances are ± 5% L and W, or ± .015" (0.38mm), whichever is greater; MB dimensions are maximum.

NOTE 2. Capacitance value in picofarads: two significant digits, followed by number of zeros. 102 = 1000 pF.

CHIP CAPACITORS ON TAPE & REEL

Popular EIA sizes are available packaged in 8mm or 12mm embossed carrier, per EIA RS 481

PRODUCT OFFERING

Sizes:
0805, 1005, 1206, 1210 (8mm tape)
1808, 1812, 1825, 2225 (12mm tape)

Dielectrics and Values:
COG, X7R and Z5U. Consult product pages of catalog for capacitance ranges and voltage ratings.

Reel Size:
7" diameter standard. 13" diameter available upon request.

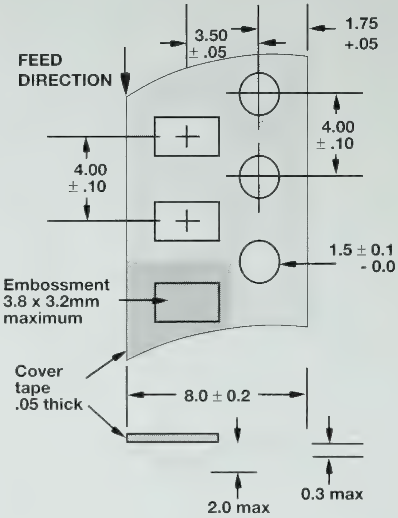
Units per Reel:
See table. Orders must comprise integral reels.

UNITS PER REEL

Chip Size	Width Tape	Units Per Reel*
0805	8mm	3000 - 4000
1005	8mm	3000 - 4000
1206	8mm	3000 - 4000
1210	8mm	3000 - 4000
1808	12mm	2000 - 3000
1812	12mm	1000
1825	12mm	1000
2225	12mm	1000

* Based on 7" diameter reel. Quantity per reel varies with chip thickness. Thicker chips (typically higher capacitance values) will result in the lesser quantities.

For maximum capacitance values (only) in sizes 0805, 1005 and 1206, units will be built to their maximum thickness, and equal to their nominal width. As thickness is a maximum dimension, versus a nominal width with ± tolerance, units may have a near square cross section (within .005"), and hence may be oriented in the reel on edge or side.

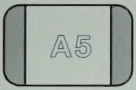


NOTE: Dimensions for 8mm tape. Dimensions with maximum tolerance are dependant on component size.

HOW TO ORDER: SEE PAGE 3

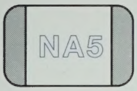
NOVACAP CHIP MARKING SYSTEM

Chip identification marking is accomplished using an excimer laser which does not degrade the ceramic structure or induce microcracks. The marking code is based on the EIA RS 198 proposed two digit code which determines capacitance value. Marking is provided by request only. To specify, use the letter M at the end of the NOVACAP part number code (see page 3).



Two position alpha numeric marking is standard and available on 0805, 1206, 1210 and 1812 size chips. The marking denotes retma value and significant figures of capacitance (see table).

example: A5 = 100,000 pF



A three position code is optional on 1206 and larger chips, denoting NOVACAP as vendor (N), followed by the standard two digit alpha numeric identification.

HOW TO ORDER: SEE PAGE 3

Value in picofarads for alpha-numeric code

Letter	0	1	2	3	4	5	6
A	1.0	10	100	1,000	10,000	100,000	1,000,000
B	1.1	11	110	1,100	11,000	110,000	1,100,000
C	1.2	12	120	1,200	12,000	120,000	1,200,000
D	1.3	13	130	1,300	13,000	130,000	1,300,000
E	1.5	15	150	1,500	15,000	150,000	1,500,000
F	1.6	16	160	1,600	16,000	160,000	1,600,000
G	1.8	18	180	1,800	18,000	180,000	1,800,000
H	2.0	20	200	2,000	20,000	200,000	2,000,000
J	2.2	22	220	2,200	22,000	220,000	2,200,000
K	2.4	24	240	2,400	24,000	240,000	2,400,000
L	2.7	27	270	2,700	27,000	270,000	2,700,000
M	3.0	30	300	3,000	30,000	300,000	3,000,000
N	3.3	33	330	3,300	33,000	330,000	3,300,000
P	3.6	36	360	3,600	36,000	360,000	3,600,000
Q	3.9	39	390	3,900	39,000	390,000	3,900,000
R	4.3	43	430	4,300	43,000	430,000	4,300,000
S	4.7	47	470	4,700	47,000	470,000	4,700,000
T	5.1	51	510	5,100	51,000	510,000	5,100,000
U	5.6	56	560	5,600	56,000	560,000	5,600,000
V	6.2	62	620	6,200	62,000	620,000	6,200,000
W	6.8	68	680	6,800	68,000	680,000	6,800,000
X	7.5	75	750	7,500	75,000	750,000	7,500,000
Y	8.2	82	820	8,200	82,000	820,000	8,200,000
Z	9.1	91	910	9,100	91,000	910,000	9,100,000
a	2.5	25	250	2,500	25,000	250,000	2,500,000
b	3.5	35	350	3,500	35,000	350,000	3,500,000
d	4.0	40	400	4,000	40,000	400,000	4,000,000
e	4.5	45	450	4,500	45,000	450,000	4,500,000
f	5.0	50	500	5,000	50,000	500,000	5,000,000
m	6.0	60	600	6,000	60,000	600,000	6,000,000
n	7.0	70	700	7,000	70,000	700,000	7,000,000
t	8.0	80	800	8,000	80,000	800,000	8,000,000
y	9.0	90	900	9,000	90,000	900,000	9,000,000

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TECHNICAL BROCHURE

NOVACAP

CERAMIC CHIP CAPACITORS

Technical Brochure

The NOVACAP Technical Brochure provides basic information on the properties of chip capacitors, their dielectric behavior, product classifications, test and quality standards, and information relevant to their use. One of the most widely read publications on the subject of multilayer capacitors, the NOVACAP Technical Brochure is available upon request.

Contact your local representative, or NOVACAP, 25111 Anza Drive,
Valencia, California, 91355 • 805-295-5920 • Fax 805-295-5928

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CATALOG 90-8-PC